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Citation

Talbot, David, Waide Warner, Carolyn Anderson, Kira Hesekiel, and Daniel Dennis Jones. 2015. "Holyoke: A Massachusetts Municipal Light Plant Seizes Internet Access Business Opportunities." Berkman Klein Center for Internet & Society Research Publication.

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HOLYOKE



A Massachusetts Municipal Light Plant Seizes Internet Access Business Opportunities

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Kira Hessekiel
Daniel Dennis Jones



Holyoke Gas & Electric's telecom division provides high-speed Internet access to local businesses and public agencies, bringing in revenue and profits while aiding in local economic development and saving the municipality more than \$300,000 a year. At the same time, it has expanded to other lines of business and serves three communities outside Holyoke which need its help. HG&E Telecom's success in a competitive environment suggests opportunities for other municipal light plants in Massachusetts and other states.

ABSTRACT

This report describes the development and recent expansion of HG&E Telecom, the fiber optic network division of Holyoke Gas and Electric (HG&E) in Holyoke, Massachusetts. HG&E is one of 41 long-standing municipal light plants providing electricity service in Massachusetts, of which 10 offer Internet access and other telecom services to retail customers, and 31 do not. HG&E Telecom competes with Comcast and Charter and serves approximately 300 business customers. It saves the municipality more than \$300,000 per year. Its revenue has increased by 10 percent over the past two years and it has expanded into new lines of business. Given that data transport needs are growing while electricity sales are flattening, the record of HG&E Telecom suggests opportunities for other municipal electric utilities across the country, as long as they are in states that haven't raised barriers to the provision of such services.

KEY FINDINGS

- HG&E Telecom saves city offices and HG&E itself more than \$300,000 a year by providing Internet access and networking and telephone services to public agencies.
- The utility provides approximately 300 businesses and large institutions with telecom services and creates competition, which tends to improve service offerings from all market participants, aiding the local economy.
- HG&E Telecom forged inter-municipal agreements that extend services and accompanying benefits to the neighboring city of Chicopee and to the city of Greenfield, 30 miles north.
- While HG&E Telecom has focused on selling services to businesses, the utility is now considering a residential fiber-to-the-home (FTTH) offering, given the declining market pressure to provide television content.
- Demonstrating that a municipal light plant can diversify into the consultancy business, HG&E Telecom also recently became project and network manager for a FTTH project in the town of Leverett.
- HG&E Telecom has shown steady growth in the face of competition, never incurred debt, and has reaped a 10 percent profit in both 2013 and 2014.

EXECUTIVE SUMMARY

In the late 1990s, city officials in Holyoke, Massachusetts—a center of the 19th century global paper industry that in recent decades has experienced depopulation and economic decline—asked the corporate predecessors of Comcast and Verizon to build a fiber optic network that could meet the needs of the city and its schools. When those companies declined, the city started building one itself. Recognizing that a pure market-based system was not serving its needs, it became one of a relatively small number of U.S. communities (now numbering about 400) that run municipal Internet access networks, also called “community broadband networks.”¹

To do this, the Holyoke Gas and Electric Department (HG&E) took several incremental steps over 15 years, using a modest initial infusion of available cash and then relying on revenue and savings—from such cost-cutting measures as adopting an Internet-based telephone system—to expand offerings without incurring debt. It first built HG&E.net, a 15.5-mile fiber optic network that interconnected all city, school, and HG&E buildings, providing cost savings and better service. Those savings were then reinvested into the network. Next, the utility formed a telecom division, HG&E Telecom, and began serving local businesses. While Holyoke hasn’t joined the ranks of 89 U.S. municipalities providing residential Internet access services, HG&E Telecom serves about 300 business customers, including institutions like banks and health care centers.

HG&E Telecom began to grow regionally in 2005, and showed that it’s possible to extend telecom offerings far beyond the usual boundaries of electricity service. It became the ISP for some businesses on the municipal fiber network owned by the neighboring Chicopee Electric Light Department (CELD). HG&E Telecom additionally provided service to three office buildings in the city of Springfield.

And in 2014, HG&E Telecom forged a regional interconnection agreement that allowed it to become the ISP for municipal agencies in Greenfield, 30 miles to the north. With these efforts, HG&E demonstrated the efficiencies of a regional approach well before the U.S. Federal Communications Commission, in 2015, supported this strategy by preempting state laws in North Carolina and Tennessee that had barred cities in those states from offering Internet access service beyond city lines.

HG&E Telecom faces competition for the business customers it serves, with Comcast and Charter offering services in Holyoke and Chicopee, respectively. Despite this, it regularly wins new customers and is profitable—with the past two years being its best ever. HG&E believes its longstanding presence in the community gives it a competitive advantage and that the additional competition it provides improves the overall business environment. The network also saves ratepayer and taxpayer dollars; HG&E estimates that providing Internet access and other telephone and network services, including connectivity to downtown security cameras, saves HG&E and the city at least \$300,000 per year. That sum represents a cash benefit beyond the management efficiencies enabled by high-speed wired Internet access connections.

HG&E also plays a role in economic development. In 2012, Holyoke attracted a \$90 million regional high-speed computing facility called the Massachusetts Green High Performance Computing Center. This was attributable to the availability of low-cost and “green” electricity from HG&E’s hydroelectric generators as well as HG&E Telecom’s ability to provide fiber service. The utility helped install 40 miles of fiber optic cable that connected the computing facility to a regional academic fiber network. To do this, HG&E Telecom used city-owned pole infrastructure in Holyoke and Chicopee and

seized that construction opportunity to install vast additional fiber capacity for itself, covering the modest additional materials cost to enable future expansion.

HG&E Telecom's business continues to expand. Growth prospects appear strong in an era when the data needs of business and government keep increasing. Over the past two years, HG&E Telecom was selected by a regional bank, People's Bank, to provide fiber connections and networking services to regional branches and ATMs; took on project and network management for a fiber-to-the-home (FTTH) project in Leverett; began the Greenfield service; and began a study of whether to provide residential service in Holyoke.

Meanwhile, a municipal light plant in a neighboring municipality, Westfield, has set plans to provide Internet-access-only gigabit-per-second (approximately 50 to 100 times faster than typical home connections) FTTH service, having concluded that market trends mean it doesn't need to offer bundled television and telephone service (often called "triple play") in order to attract customers. In June of 2015 Westfield started offering household service in a pilot area. Similar ideas have been raised by management at another neighboring municipal light plant, in South Hadley.

HG&E Telecom is growing. In 2014, HG&E. net increased its network backbone capacity tenfold using the same physical infrastructure by adding next-generation electronics. Revenues in 2014 and 2013 were about \$2.2 million, an increase of more than 20 percent over the previous three years, and reflecting a nearly 10 percent profit margin.²

MUNICIPAL NETWORKS IN AND AROUND HOLYOKE

Greenfield

The municipality gets Internet access service to city buildings from HG&E Telecom and has set plans for a \$4.7 million citywide fiber network.

Leverett

This rural town is building a fiber-to-the-home network, using HG&E Telecom as the project manager and network operations manager. HG&E Telecom monitors the Leverett network remotely using a state-owned fiber optic network.

South Hadley

Management of the South Hadley Electric Light Department has proposed providing fiber Internet access service to a downtown mixed-use development as a first step toward a townwide project. The utility's board is reviewing the proposed project.



Holyoke

HG&E Telecom's fiber network serves about 300 businesses and government offices in Holyoke and Chicopee (using Chicopee Electric Light Department's network), and three office buildings in Springfield that sit near HG&E Telecom's connections to the wider Internet. HG&E Telecom has also forged inter-municipal agreements with Greenfield and Leverett. It is now considering a residential fiber offering; neighboring Westfield Electric Light Department is now piloting one.

Westfield

Like Holyoke, Westfield has a municipal electric utility that provides Internet access service to government offices and businesses. But the Westfield Electric Light Department is also now piloting a high-speed residential fiber offering on a few streets.

The City of Holyoke

Holyoke lies along a stretch of rapids on the Connecticut River in western Massachusetts. In 1849, Holyoke became the first planned industrial city in the United States. In that year, construction started on 4.5 miles of canals through which river water provided power to manufacturing facilities. When logging intensified in northern New England in the late 19th and early 20th centuries, Holyoke was a terminus of vast river-borne log drives. Holyoke became the world's biggest paper manufacturer and earned the nickname "Paper City."³

Today many of the mill buildings are deserted, the paper industry has all but vanished, and some downtown businesses are boarded up. Holyoke's present population of 40,000—down sharply from its peak of 60,000 in 1920—faces significant economic and social challenges.⁴ Holyoke's median household income is just \$31,628, far lower than the statewide median of \$66,866.⁵



Downtown Holyoke, showing the canal system.

Holyoke Gas & Electric: A Massachusetts Municipal Light Plant

Holyoke residents and businesses are served by the Holyoke Gas & Electric Department (HG&E). HG&E is a "municipal light plant," or MLP, owned by the city but separately governed, overseen by three board members appointed to six-year terms by the city's mayor. It is one of 41 electricity-providing MLPs in Massachusetts, serving 51 municipalities.⁶ Most were founded in the late 19th and early 20th centuries.

Although all originally owned power plants, most are now distribution utilities, buying electricity on wholesale markets and selling it locally. Holyoke is unusual in having substantial hydroelectric generation capacity. It produces more than 60 percent of the electricity it sells from turbines that capture flows both from the Connecticut River and within the canals installed in the 19th century. In recent years HG&E acquired the hydroelectric assets of the Holyoke Water Power Company (HWP).

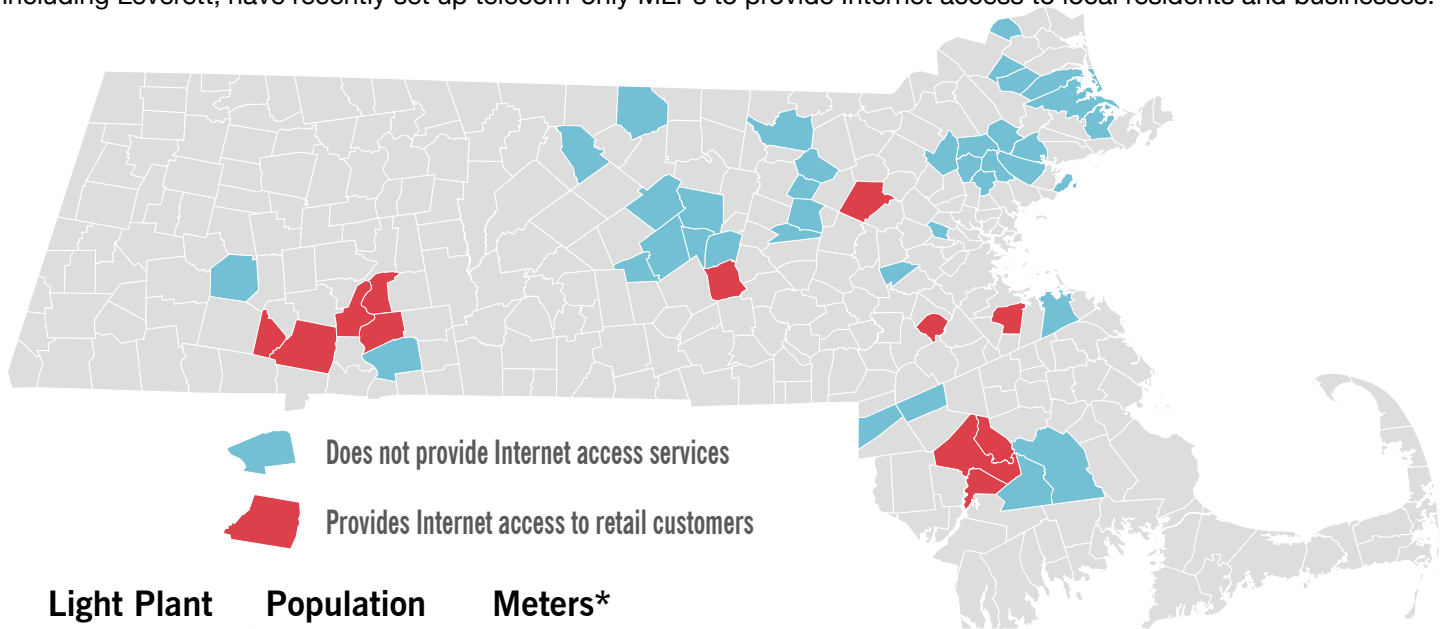
In 1996, a change in Massachusetts state law explicitly allowed the state's MLPs to go into the telecommunications business.⁷ To date, 10 of those longstanding electricity-providing MLPs have done so (see page 7). In a set of separate developments outside the scope of this report, a number of towns in central and western Massachusetts have established telecom-only MLPs in order to develop their own fiber optic networks connecting to a state-owned network known as MassBroadband 123, described on page 16 of this report.

Holyoke Dam, Holyoke, MA



Municipal Electric Utilities: Internet Access Offerings

Of the 41 Massachusetts municipal light plants (MLPs) that historically provide electric service, 10 are also in the Internet access business (shown in red). While some others operate fiber networks for government or utility use, and may lease fiber to private companies, they do not directly provide Internet access to customers. Some towns not highlighted here, including Leverett, have recently set up telecom-only MLPs to provide Internet access to local residents and businesses.



Light Plant	Population	Meters*
Ashburnham	43,866	2,977
Belmont	24,729	11,176
Boylston	4,355	2,133
Braintree	35,744	15,997
Chester	1,370	689
Chicopee	55,298	25,716
Concord	17,668	8,090
Danvers	26,493	13,112
Devens	1,840	433
Georgetown	8,183	3,479
Groton	10,646	4,831
Groveland	6,469	2,696
Hingham	22,157	10,313
Holden	17,346	8,600
Holyoke	39,880	27,780
Hudson	25,653	12,585
Hull	10,293	6,175
Ipswich	13,175	6,880
Littleton**	14,000	6,500
Mansfield	23,184	9,715
Marblehead	19,808	10,500
Merrimac	6,338	2,825
Middleborough**	34,000	16,269
Middleton	8,987	3,643

North Attleborough	28,712	13,354
Norwood	28,602	15,356
Paxton	4,806	1,854
Peabody**	55,000	25,466
Princeton	3,413	1,430
Reading**	71,000	29,908
Rowley	5,856	2,840
Russell	1,775	465
Shrewsbury	35,608	15,100
South Hadley	17,514	7,748
Sterling	7,808	3,714
Taunton**	83,000	36,754
Templeton	8,013	3,525
Wakefield	24,932	12,902
Wellesley**	35,000	10,058
West Boylston	7,669	3,540
Westfield	41,094	27,733

TOTAL 931,284 424,861

Source: Northeast Public Power Association directory, individual MLPs, Institute for Local Self-Reliance.

* Number of meters corresponds to number of customers (households and businesses) except where the utility (HG&E included) operates both gas and electric meters.

** Electric service territory includes other municipalities, and population is an estimate. Taunton's service territory includes the towns of Berkley and Raynham.

Building a Community Network

HG&E—which initially installed fiber optic cables to allow headquarters to get data from and issue commands to electrical substations—expanded the fiber network into a thriving business through a series of incremental and opportunistic steps. It never issued debt. Instead, it started with modest initial investments of available cash and later used savings and revenue to support expansions and create today’s profitable system.

As a first step, in 1996, HG&E installed a six-strand fiber optic cable connecting its headquarters to two substations in order to improve communications with its control system, known as a SCADA (supervisory control and data acquisition) system. A previous copper wire, leased from a corporate forerunner to Verizon, had proved unreliable and triggered false alarms.

In the late 1990s, Holyoke was—and still is—served by copper telephone lines with DSL from Verizon (or its predecessors) and coaxial cable TV and Internet service from Comcast (or its predecessors). In 1995, Holyoke Mayor William Hamilton recognized that this service was inadequate for city and school data needs. He approached the incumbent cable television companies (Continental Cablevision and Media One at that time) and telephone companies (NYNEX and Bell Atlantic at that time) with a proposal: if these companies would build advanced fiber infrastructure serving all city and school sites, the city would pay for ongoing Internet access services. He requested that they put proposals on the table, but the private providers declined to do so.⁸

“We’re a local utility that’s been around for 100 years. People know us, and there is a comfort factor.”

Brian Beauregard, then an HG&E assistant superintendent, then raised the idea of HG&E doing the project itself and designed a 15.5-mile fiber optic ring that could interconnect most municipal and school buildings to provide high-speed Internet access and data and voice services. The Holyoke Public Schools and City of Holyoke committed \$532,800, about half of the initial installation costs.⁹ HG&E’s Commission authorized General Manager George Leary to move forward, approving \$1 million for the project in 1997 and \$225,000 the following year. Half of this money came from HG&E’s capital funds and the other half from available “free cash” from the city and schools. The city reimbursed HG&E \$102,720 to build the network plus another \$24,000 per city building added to the network.¹⁰ In return HG&E agreed not to charge the city any lease rates on those lines for their lifetimes but instead to charge only for services provided over them. Eighteen years later, in 2015, the lines are still being used, with additional capacity and functions enabled

by upgraded electronics. The network connected to the wider Internet at a “point of presence” in Springfield. The finished network consisted of a 15.5-mile fiber optic ring with up to 288 strands and active connectivity to 15 schools, eight city sites, and four HG&E sites (adding to the

two substations already served by the 1996 link).¹¹ The project was led by Beauregard, Bill Welch of Holyoke Public Schools, and Carl Cameron, who headed the city’s computer department.

HG&E soon began serving local businesses, which started “knocking on our doors” in 1997.¹² At the time, businesses lacked high-speed Internet access connectivity. In the fall of that year the commission created the first



Management and Staffing at Holyoke Gas & Electric

Jim Lavelle (left)
General Manager

Tim Haas (center)
Chief Telecommunications Engineer

Kirk Jonah (right)
Operations Manager, Telecommunications

Brian Beauregard (*inset*)
Superintendent, Electric Division

HG&E has 140 FTEs (full-time equivalent employees), including 44 in its electric division, 13 in its telecom division, 31 in its gas division, 29 in its hydroelectric generation division, and 23 in its finance, administration and customer service departments.

rates for private Internet access and data services. Within months HG&E was serving flagship customers including NTP Republic, a vinyl packaging manufacturer, and Oakes Electric, an electrical supply store. Installation costs were recouped from service fees.

Under state law HG&E needed a city council vote to formally authorize its entrance into the telecommunications business. The city council took such votes in December of 1998 and August of 1999 unanimously authorizing HG&E's new initiative.¹³ Then, in a ballot question in November of 1999, city voters approved a non-binding referendum to approve a community antenna television system (CATV), but the utility did not enter the TV business.¹⁴

Municipalities entering the telecom business can hire private companies to construct a network, manage the network, and provide service over it. HG&E chose to do nearly everything itself. (One exception was that in the early years HG&E hired a private company, 3SI, to operate and monitor the network. In 2002 it brought those functions in-house, and also created HG&E Telecom as a separate division.) In 1997 HG&E became an Internet service provider (ISP) and directly provided a range of services including fiber Internet access, email, Web hosting, and usage-based billing to its business and institutional customers. HG&E Telecom does not serve residential customers.

HG&E's telecom team includes Todd Taupier, Adam Jasionkowski, Keith Pronowicz, Daniel Bedore, Edward Griffin, and Tim Haas (standing, left to right); and Peter Vichi, Stephen Bouvier, and TJ Robak (sitting, left to right).

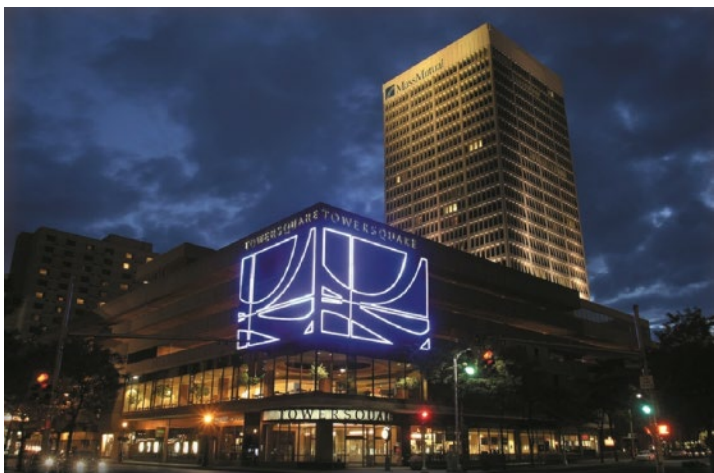


A Hometown Advantage in a Competitive Market

By offering high-speed Internet access and other services to businesses, HG&E Telecom injected competition into a market previously controlled by large providers. HG&E believes that it has a competitive edge thanks to its reputation, existing relationships with its customers, and commitment to customer service. In cases of service interruptions, HG&E averages a 15-minute response time and restores service within four hours.¹⁵ Technicians live locally and customers have access to management. As Kirk Jonah, the HG&E telecommunications manager, puts it: “We’re a local utility that’s been around for 100 years. People know us, and there is a comfort factor.”

And to the extent HG&E helps businesses move to the area or stay in business, it also helps itself because it then also gains (or retains) an electricity customer.

The “Tower Square” office and retail complex in Springfield



HG&E Telecom offers businesses a range of premium services. Rates are competitive in the business market. HG&E Telecom has won more than 300 customers.

High-speed Internet access

- Symmetrical (upload and download speeds are the same)
- Speeds up to 1 Gbps
- Includes Web hosting and business email
- Guarantees on reliability and service

Multi-site networking

- Secure high-speed connections between multiple locations, up to 1 Gbps

Wide area networking

- Connects multiple sites of an organization with speeds up to 10 Gbps
- Bandwidth is guaranteed thanks to dedicated optical circuits.

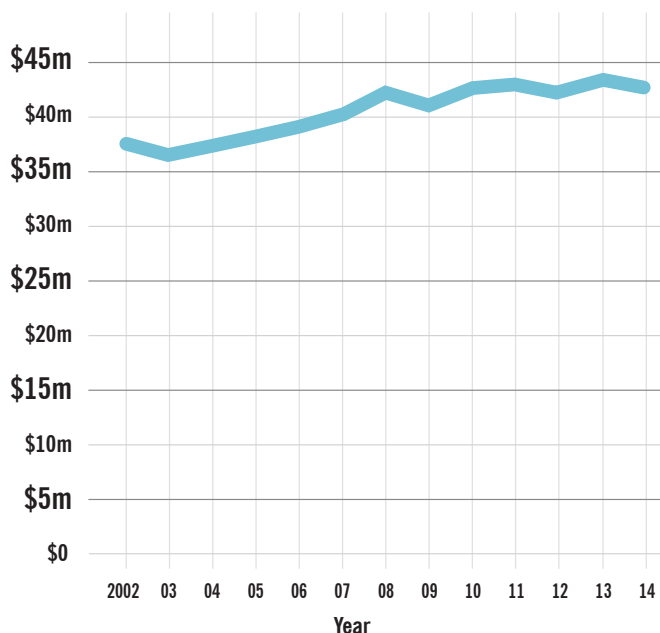
Right from the start, HG&E Telecom faced competition for its business customers. In 1997 Holyoke Health Center, for example, sought and received competitive proposals for connectivity from all available providers and chose HG&E Telecom. Holyoke Medical Center (called Holyoke Hospital at the time) and Holyoke Community College did the same in 1998. The competition has intensified: in Holyoke, Comcast started providing high-speed fiber optic connections for businesses around 2008. In Chicopee, Charter did the same.¹⁶

HG&E Telecom soon ventured beyond its municipal boundaries to provide service to Springfield, five miles to the south. HG&E Telecom already had a presence in the city; it has two Internet access points of presence (or POPs) in Springfield. One of these two POPs is at Tower Square, an office and retail complex at 1500 Main Street. In 2003, HG&E Telecom made a deal with the Tower Square owner to install fiber to tenants in the complex. With a total capital investment of \$250,000, it began service.¹⁷ Two years later, HG&E Telecom added a second Springfield office building, One Monarch Place, to the network following a further \$200,000 capital investment. In 2008, it added a third office building, at 1441 Main Street, for \$50,000. For each of these three projects, revenue covered capital costs in less than five years.¹⁸ HG&E Telecom now has about 300 business customers.

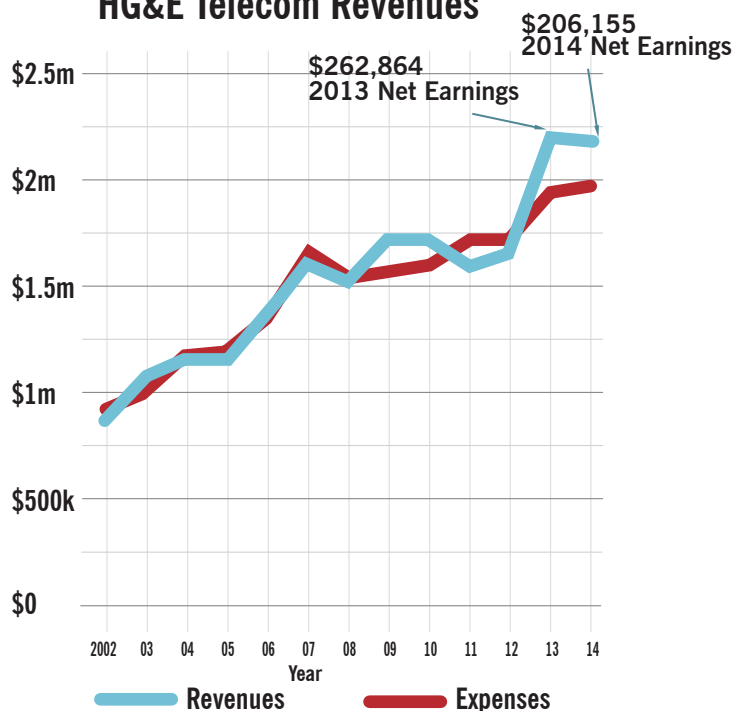
Electricity Stagnates, But Telecom Grows

HG&E, like most electric utilities, faces flattening electricity sales. But unlike most of its 40 municipal counterparts in Massachusetts, HG&E has a telecom division. There, revenue is growing and total net earnings over the past decade have exceeded \$500,000.

HG&E Electricity Revenues



HG&E Telecom Revenues



HG&E has tracked its telecom division separately since 1997. The division experienced losses in five of the last ten years. However, over the ten years as a whole, its total net income exceeded \$500,000. Its best years were 2013 and 2014.

HG&E's interpretation of state law is that telecommunications rates are subject to same requirements as electric and gas rates. Rates must be set to, at minimum, cover the cost of providing the service, and yield no more than an 8 percent return on assets.

The current net book value of HG&E Telecom is approximately \$8.4 million, after accumulated depreciation of \$2.9 million.¹⁹ Electronics and certain other pieces of equipment are depreciated over a four- to 10-year period. Fiber cable and mounting hardware are depreciated over a 33-year period.

Since inception, the division has covered its costs—including depreciation, operation, and maintenance—without debt issuance by the city or HG&E and without requiring subsidies from electricity or gas ratepayers.

Municipal Government Benefits

HG&E Telecom Saves City Hall and Itself More Than \$300,000 Annually

HG&E Telecom charges the city of Holyoke \$1,930 per month for Internet access and data services, which include a network management system, content filtering, and firewalls.²⁰ This fee reflects the cost to render the service only. (As noted above, the city made a one-time investment to build the network in 1997 and also provides HG&E with space in City Hall for a telecom hub.)



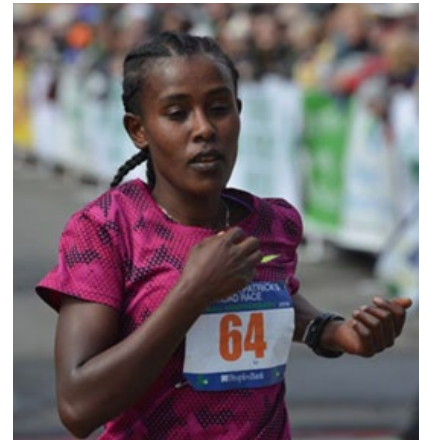
HG&E main office

HG&E Telecom estimates that the services it provides the city—which include connectivity to security cameras used by local police and other agencies—are worth at least \$20,000 a month.²¹ This figure derives from the published rates of various providers (including HG&E Telecom itself) and from subtracting customary discounts. This suggests that HG&E Telecom saves Holyoke municipal offices more than \$200,000 per year. In addition, HG&E provides telecom service to itself, which Beauregard, the architect of HG&E's fiber business, estimates saves at least another \$100,000 per year. In total, HG&E Telecom has allowed the municipality and its utility to save more than \$300,000 a year or more than \$3 million over the past 10 years.

A Fiber Optic and Video Testbed for Boston Marathon Security

The network also serves as a foundation for new municipal applications and was a testbed for advanced video security technology prior to its deployment along the route of the 2014 Boston Marathon, according to HG&E.

In downtown Holyoke, various city agencies—including the Police Department, Department of Public Works, Fire Department, Mayor's Office, Library, City Clerk, and Council on Aging—have attached more than 100 video cameras to the network. HG&E Telecom manages the storage and retrieval of the video content. The network aids public safety; in 2013, an HG&E Telecom camera captured images of two burglars fleeing with power tools stolen from a manufacturing facility.



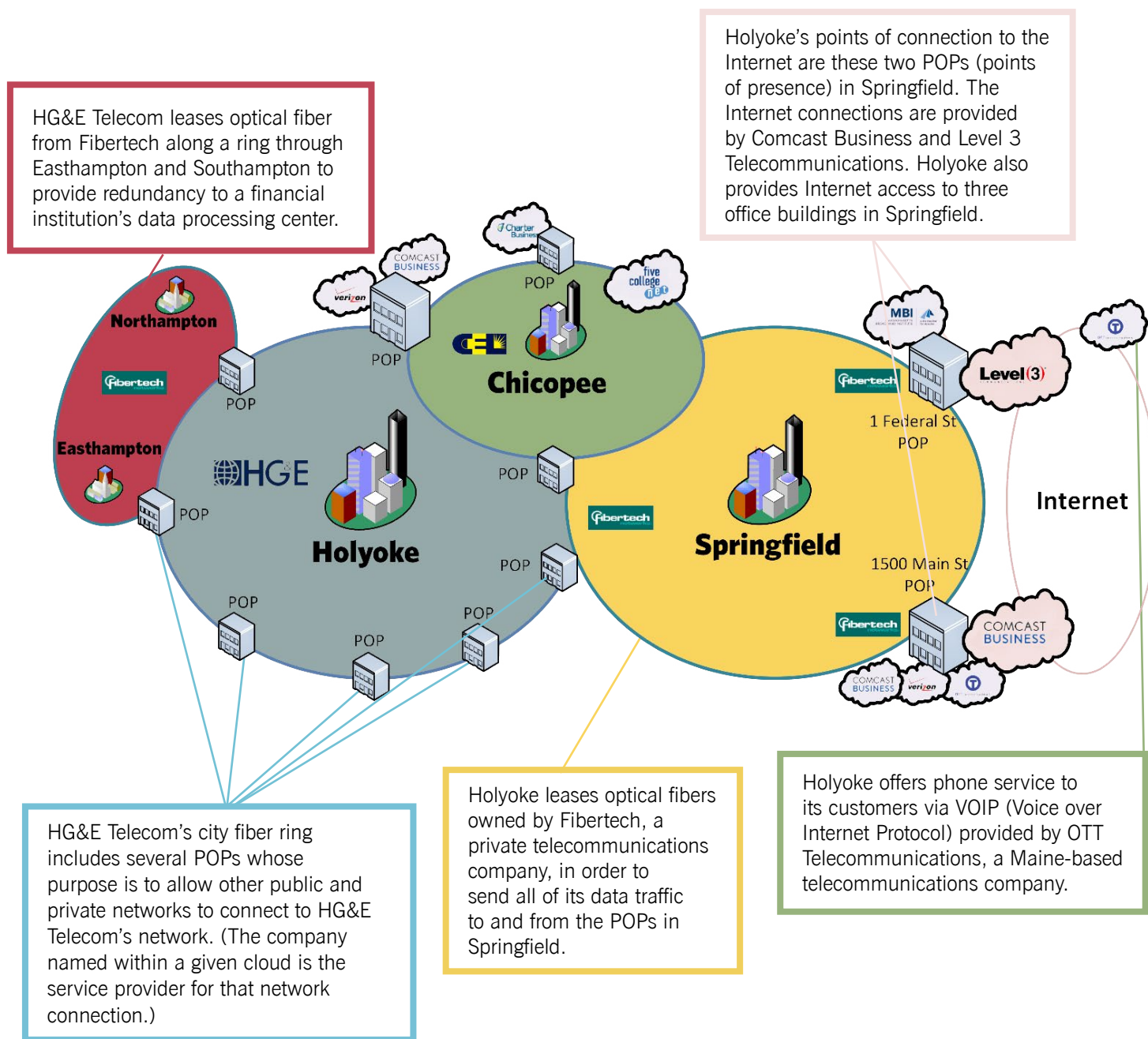
Etalemahu Habtewold sets a new course record at the 2014 Holyoke St. Patrick's Road Race

In early 2014, the defense contractor Raytheon and the U.S. Department of Homeland Security (DHS) used the Holyoke camera network to test new technology intended to provide enhanced security at the 2014 Boston Marathon, one year after the bombings that killed three people and injured 264 others.²² Raytheon and DHS ran the test during a 10K race in advance of Holyoke's St. Patrick's Day parade. Among other things, the technology detects gunshots or explosions, then swivels nearby cameras to aim at that location. HG&E Telecom did not charge the company or DHS for this testing service.

The Technology and Topology of HG&E.net

HG&E Telecom owns a 15.5-mile fiber ring but uses numerous connections to other public and private networks to service three other municipalities; connect regional branches and ATMs of a large bank; and offer customers Internet-based telephone services that are managed by a company in Maine.

HG&E.net supports speeds of up to 10 gigabits per second (Gbps). Holyoke's network can route multiple 10 Gbps signals at once using carrier Ethernet cables and a technology called dense wavelength division multiplexing. The network was built long before the Massachusetts Broadband Institute (MBI) started building a network in western Massachusetts. However, HG&E now uses the MBI network to expand its business offerings. The MBI network allows HG&E Telecom to serve as the ISP to Greenfield and monitor and manage the fiber network in Leverett.



Economic Development

An Academic Computing Center Chooses Holyoke

In 2012, a \$90 million data center—the Massachusetts Green High Performance Computing Center (MGHPCC)—opened on a former derelict mill site in downtown Holyoke. Built and operated by a consortium of academic research institutions—the Massachusetts Institute of Technology, University of Massachusetts, Boston University, Harvard University and Northeastern University—it now serves thousands of researchers.²³

MGHPCC chose Holyoke for two principal reasons: availability of low-cost renewable energy from HG&E's hydroelectric plant, and availability of high speed fiber optic service through infrastructure provided by HG&E Telecom.

The existence of HG&E's telecom business conferred a number of benefits to both the data center and HG&E. First, HG&E Telecom helped construct the fiber loop that connects MGHPCC to a university-operated backbone that provides high-speed connections to all of the university consortium's campuses plus a

number of regional, national, and international research networks. The funding for the fiber loop was part of more than \$10 million in infrastructure improvements paid for by MGHPCC with some assistance from the Commonwealth of Massachusetts.

Given that HG&E Telecom and the neighboring utility in Chicopee owned the relevant poles, the utilities could avoid make-ready expenses and pole attachment fees.²⁴ The installation job also provided an opportunity for HG&E Telecom to expand its own fiber infrastructure. HG&E was able to leverage its effort in installing 12 strands of fiber for MGHPCC to put up plenty of extra fiber—144 strands in total—and pay the incremental extra materials cost itself.²⁵ This gave HG&E 132 extra strands for future business growth.

The same opportunity is available to other municipal utilities. They can offer incoming high-tech businesses a good deal on fiber installation and then piggyback their own infrastructure expansion atop such jobs.

The Massachusetts Green High Performance Computing Center



The data center project was the largest economic development project in Holyoke since the late 1970s. At the start of the project in 2010, the Commonwealth of Massachusetts and city of Holyoke established a “Holyoke Innovation District” around the site and the city has recently begun attracting businesses that need high-speed data connections.

HG&E Telecom's Inter-Municipal Agreements

HG&E has expanded its operations through inter-municipal agreements with three municipalities—Chicopee, Leverett, and Greenfield. These deals provide modest revenue streams and also illustrate how a MLP telecom division can extend its offerings far beyond the usual geographic boundaries of electricity service under state laws allowing inter-municipal agreements.²⁶

Chicopee

HG&E Telecom provides Internet access service to 35 business customers in neighboring Chicopee.

HG&E Telecom's earliest inter-municipal agreement was with Chicopee, a city bordering Holyoke to the southeast. It has a population of about 56,000 and is home to the Westover Air Reserve Base, the country's largest reserve base.²⁷ Like Holyoke, Chicopee has its own municipal electric utility, the Chicopee Electric Light Department (CELD).

Historically, the city was served by Verizon for phone service and Charter for cable service. Charter added fiber in parts of the city after 2008. For the same reason Holyoke initially built a fiber network—to serve the municipality itself—CELD built fiber loops between 2003 and 2005 to serve public buildings.²⁸ Just as had happened in Holyoke, private customers in Chicopee soon began inquiring if they could get Internet access over the new fiber. CELD sought a partner.²⁹

The two municipalities made a deal. HG&E Telecom would lease some of CELD's unused or "dark" fiber, providing CELD with a revenue stream. And HG&E Telecom would provide the Internet access service to any customers

The Ames Privilege Mill in Chicopee



within downtown areas of Chicopee passed by the fiber, providing revenues to HG&E Telecom. HG&E Telecom first installed an access switch in Chicopee at a cost of \$150,000.³⁰ CELD built out fiber connections for each new customer in Chicopee and leased those new lines to HG&E. (The lease rate and time period—usually three to five years—is tailored to cover the cost of each installation.) In 2015, HG&E Telecom had 35 customers in Chicopee, mostly large businesses that Jeff Cady, CELD's general manager, describes as "needing a very high up-time, had issues with their current carrier, and were looking for better options."³¹ This collaboration is a model for other MLPs to consider.

Leverett

HG&E Telecom serves as project manager and network operations manager for a fiber-to-the-home project in rural Leverett.

Leverett lies 28 miles northeast of Holyoke and has a population of about 2,000. Many residents are second-home owners or professors or staff from nearby colleges in and around Amherst. Although Leverett lacks a municipal electric utility, its citizens recently formed an MLP entity for the purposes of building a fiber-to-the-home (FTTH) network. Its citizens adopted a tax increase to pay the \$3 million construction cost. The network, called LeverettNet, connects to MassBroadband 123 (see below).³²

But Leverett then had a new challenge: finding someone to move the project forward. By 2013, the success of HG&E.net was well understood by municipal managers in the region. Officials in Leverett called HG&E Telecom for advice and ended up hiring HG&E Telecom as a project manager overseeing the network's



Peter d'Errico, Leverett selectman, in the town's new telecom hut

construction at a rate of \$9,000 per month.³³ In early 2015, with the network undergoing testing, HG&E Telecom took on the additional responsibility of network operations manager for LeverettNet, providing monitoring, maintenance, and coordination services for \$5,400 per month.³⁴ HG&E Telecom uses the MassBroadband 123 network to perform the monitoring remotely.

The Berkman Center published a case study of LeverettNet by Susan Crawford and Robyn Mohr, entitled "Bringing Municipal High-Speed Internet Access to Leverett, Massachusetts," in December 2013. The study is available on SSRN (<http://ssrn.com/abstract=2366044>).

Photos: Matthew Cavanaugh; John Phelan; HG&E

MassBroadband 123 Network Allows MLPs to Expand



The MassBroadband 123 network

In 2013, the Massachusetts Broadband Institute, a state agency, completed a regional fiber optic network in western Massachusetts. Called MassBroadband 123, it consists of 1,200 miles of fiber optic infrastructure and includes Internet connections at more than 1,100 "community anchor institutions" (such as town halls and police stations, but not homes or businesses) in 123 communities in western and central Massachusetts.³⁵

In 2015, with new state funding available, dozens of those communities are working to extend this network to individual homes and businesses. Those activities are beyond the scope of this report but may be covered in future Berkman Center reports.

Within the Holyoke city limits, MassBroadband 123 runs the length of Interstate 91 and includes approximately 12 miles within the city. Though it arrived long after HG&E Telecom developed its network, MassBroadband 123 allows HG&E Telecom to explore new business development opportunities.

Greenfield

HG&E Telecom serves as the ISP for city buildings in Greenfield, using MassBroadband 123 to connect the municipalities with one another.

The city of Greenfield flanks the Connecticut River where that waterway meets the Green and Deerfield Rivers, about 30 miles north of Holyoke. It was first settled in 1686 and, like Holyoke, was once a thriving mill and railroad town.



Greenfield Court Square

With the arrival of MassBroadband 123, Greenfield gained seven miles of fiber and two Internet access nodes—one at City Hall and one at the police station. The city administration now has ambitious plans: a proposed \$4.7 million “Greenfield TelNet” that would create a 50-mile fiber optic loop that would serve—via wired or wireless connections—all homes, 550 businesses, and every federal, state, and municipal facility in the city.

Tim Haas



So far it is just a vision. As Greenfield Mayor William Martin puts it, the city is on “a quest for independence.” The city created a Technology Master Plan and has taken steps to create an MLP for telecom business. With the city council having voted in favor of the MLP telecom structure, the

final vote to formalize its creation will come before city voters in November 2015. If the MLP is created, the city will seek voter approval to issue bonds to cover the project’s costs.

Meanwhile, Greenfield wants to at least activate the MBI nodes. So Martin last year made a call to a familiar place: HG&E Telecom. In 2014, HG&E Telecom made a network interconnection to Greenfield through the MassBroadband 123 network. HG&E Telecom now serves as the ISP for Greenfield’s City Hall and police, collecting a \$6,300 monthly fee for the service.³⁶

Substantial savings are expected: a business plan for the city created in 2012, and subsequently revised slightly, estimates that annual city savings on telephone alone will amount to more than \$158,000, and savings on Internet access service will approach \$69,000.³⁷

Television Not Required: MLPs Look Anew at Fiber to Households

HG&E has long considered offering fiber-to-the-home (FTTH) Internet access service to Holyoke residents. But like other municipalities, HG&E faced a daunting reality: it would have to compete with bundled Internet access, television, and telephone services: the so-called “triple play.” Historically, it has been difficult for a municipality to compete with incumbent cable companies and their television content packages. Large cable companies benefit from bulk discounts that allow them to pay a third or half as much for programming as a

small provider would, and programming costs have skyrocketed in recent years. But as more consumers grow comfortable with online video services like Netflix and Hulu and Internet-based telephone services offered by separate carriers, the idea of providing Internet access services alone is growing more feasible. For example, Comcast now has more Internet access customers than pay-TV customers. Two neighboring MLPs, in Westfield and South Hadley, are taking steps to move forward on gigabit-speed residential offerings without a TV package.

Westfield’s Residential Pilot: “Gigabit for Life”

Westfield borders Holyoke to the southwest. Where Holyoke was the “paper city,” Westfield was “whip city”—the factories of Westfield once turned out buggy whips.³⁸ Like Holyoke, Westfield has an MLP, the Westfield Gas and Electric Department (WGE), that has provided Internet access service to municipal buildings and businesses—but not homes—for more than a decade.³⁹ But in the summer of 2015, Westfield began taking orders for a pilot service of 1 Gbps residential Internet access scheduled to launch in October to a few streets in Westfield.⁴⁰ The offering will include optional

phone service, but no TV bundle. WGE had rejected the idea of residential service several times over the past 10 years because it would have meant providing TV content. Now, however, on-demand video services are becoming popular. Whip City Fiber is offering service of \$49.99 per month for 200 Mbps and \$69.99 per month for 1 Gbps, with a Wi-Fi enabled router available for an extra \$5. A third “Gigabit for Life” option will be offered for \$59.99 per month (plus \$5 for the Wi-Fi capability). If customers sign up within three months, that price will stay fixed for as long as they keep the service.⁴¹ The pilot will potentially serve 300 customers.⁴²

Westfield’s Town Square



South Hadley: A High-Speed Internet Access Proposal

Management of the South Hadley Electric Light Department hopes to start townwide service, initially in a mixed-use development.

South Hadley borders Holyoke to the east, across the Connecticut River. It is a small community of 17,300, home to Mount Holyoke College, and is served by the South Hadley Electric

Selling gigabit-per-second Internet access in South Hadley for \$79.95 a month would be a “wonderful opportunity for us to diversify revenue.”

-Wayne Doerpholz, general manager, S. Hadley Electric Light Department

Light Department (SHELD).⁴³ SHELD became connected to regional fiber networks in 2008 as part of the build-out of an intercampus network linking Mount Holyoke, Amherst, Hampshire, and Smith Colleges and the University of Massachusetts, Amherst. SHELD owns the section of that network that passes through South Hadley and uses it to connect municipal buildings and a handful of commercial and industrial customers.⁴⁴

Wayne Doerpholz, SHELD’s manager, has bigger plans. Working with AXIA, the Canadian telecom group that operates the MassBroadband 123 network, he designed a plan to offer residential service for 500 Mbps upload and download at \$49.95 per month and 1 Gbps for \$79.95 per month.⁴⁵ With these services, Doerpholz believes SHELD could attract customers frustrated with low-quality Internet access services, many of whom have reached out to the utility seeking a local alternative. He hoped to start with a pilot program in South Hadley’s

Village Commons, a mixed-use development consisting of commercial businesses and 19 residences. Doerpholz also saw the plan to provide gigabit Internet access service to South Hadley as “a wonderful opportunity for us to diversify revenue” and help attract businesses.⁴⁶

According to Doerpholz, the engineering plans for the townwide fiber optic system are substantially

complete and nearly half of the Village Commons customers have signed up for Internet service. However, construction cost estimates still need to be determined and a final business plan approved by the light board, which in June of 2015 sent the project proposal for independent review.⁴⁷



South Hadley's Village Commons

Recent HG&E Telecom Growth

In 2014 HG&E Telecom reported strong revenue growth, and the division continues to find new opportunities for expansion. By re-engineering its existing infrastructure, HG&E Telecom is able to provide faster service, and in some places is “providing 100 times the service on the same fiber ring,” Haas says.⁴⁸ In 2014 HG&E Telecom completed a major network backbone upgrade from 1 Gbps to 10 Gbps and, with a partner, OTT Communications of Portland, Maine, entered into new contracts for business telephone services.

Some expansion results from new kinds of agreements with incumbent carriers. For years, if a customer didn’t want HG&E Telecom’s fiber service and instead only wanted cable with slower speeds at lower prices, HG&E Telecom would “resell” the Comcast or Charter service and collect a commission.⁴⁹ This relationship recently evolved to include a novel interconnection arrangement to serve People’s Bank. The bank has 17 branches and eight freestanding ATMs in towns flanking Interstate 91 on a 20-mile stretch from Longmeadow to Amherst. The bank’s headquarters in Holyoke has been a customer of HG&E Telecom for about 15 years. When Joe Zazzaro, the senior vice president of People’s Bank, sought a secure network for all branches two years ago, he wanted to continue the relationship with HG&E Telecom. There was a problem: its network covered only Holyoke and, through CELD, Chicopee.⁵⁰ To cover other areas, HG&E Telecom acted as a broker and sold leases for Comcast and Charter to connect those branches, while HG&E Telecom operated and serviced the actual network.⁵¹

HG&E Telecom Tries Providing Wireless Infrastructure

In recent years, HG&E contemplated a utility-scale wind power project atop Mount Tom, a 1,200-foot mountain at the northern tip of the city. The plan was to install three turbines that would stand 500 feet tall from tower base to blade tip. The company installed a 180-foot tower and fiber connection to the top of the mountain, to provide for wind-monitoring surveillance in advance of construction. In the end, the U.S. Federal Aviation Administration blocked the plan for the wind turbines.⁵²

Nevertheless, the infrastructure is generating benefits. Wireless communications technologies require fiber connections (called “backhaul”) to carry data to and from radio transmitters that are generally sited atop hills and tall buildings. Already, Holyoke’s police and fire departments have installed radio transmitters on HG&E’s towers, for no attachment fee.⁵³ In addition, the tower is enhancing the utility’s ability to read meters remotely. A wireless collector was installed on the tower to allow the utility to gain a “line of sight” to capture radio signals from HG&E’s electric and gas meters in West Holyoke and its gas meters in the town of Southampton (where HG&E has a gas franchise). This enhanced communication now allows HG&E to do remote meter-reading that had previously been impossible in these areas. HG&E Telecom is now actively marketing its tower space and backhaul to wireless carriers who may need extra capacity.

Conclusions & Next Steps

More than a century ago, local leaders in Massachusetts began creating municipal light plants—41 of which survive today—to provide their communities with electricity. Today these same institutions, and other municipalities lacking MLPs, are in a strong position to find and pursue local opportunities to develop next-generation infrastructure to provide Internet access services necessary for 21st century economic development.

MLPs already own infrastructure such as poles and conduit. In many cases they've already installed fiber optic cable. And they enjoy longstanding relationships with local customers. While many of those customers are using less and less electricity, they're demanding more and more data.

Yet of the state's 41 longstanding municipal electric utilities, only 10 are serving retail customers with Internet access services. While the scope of this report is limited to HG&E and municipalities it serves or borders, the track record of HG&E Telecom suggests that Massachusetts MLPs have a telecom opportunity today.

- Despite operating in a competitive environment for the business customers it serves, HG&E Telecom has not only succeeded but expanded to other municipalities. It has won 300 customers and made \$500,000 in profit over the past decade. Its best years were 2013 and 2014.

- The utility has shown that ownership of poles is a powerful tool for economic development. For a customer needing dedicated fiber connections, a town with a municipal electric utility might look attractive, especially if local electric rates are lower, too.

- Thanks to HG&E Telecom, the municipality itself has saved more than \$3 million over the

past decade on internal telecom costs. After Holyoke funded the initial fiber loop using moderate amounts of cash on hand, the low-cost service provided by HG&E Telecom has saved the City of Holyoke and HG&E itself more than \$300,000 every year.

- HG&E Telecom has avoided residential offerings because they involved going into the TV content delivery business. But today, more consumers are moving to Internet-based services, making clear that a high-speed Internet access offering can now work without TV. That's a conclusion the Westfield Electric Light Department, and others, have reached.

More research and information-sharing is needed to help MLPs and municipalities move forward. Further research is needed to produce individual MLP case studies and to identify ways that municipalities and MLPs might work cooperatively. As part of that, municipalities need guidance on financial models and pricing. Municipalities and MLPs would benefit by mapping all existing publicly owned fiber in their territories. And MLPs need ongoing business and technical assistance on the Internet access side of their businesses.

The Northeast Public Power Association, or NEPPA, is a respected service organization of 80 public power agencies that has historically focused on training and policy on the electric side of the business. NEPPA is well-positioned to provide new kinds of educational services to MLPs on the telecom side. And the possible membership base is growing. New telecom-only MLPs are starting to appear in places like western Massachusetts, where they are connecting to a state backbone.

High-speed Internet access is crucial to local economic development and national competitiveness. HG&E Telecom has amply demonstrated what an MLP can do today.

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Acknowledgments

Susan Crawford, John A. Reilly Professor at Harvard Law School and a co-director of the Berkman Center; Rob Faris, research director at the Berkman Center; and Christopher Mitchell, director of the Community Broadband Networks Initiative at the Institute for Local Self-Reliance, provided invaluable guidance and feedback on early drafts of this report.

Special thanks to the management and staff at the Holyoke Gas & Electric Department; Kris DiGirolamo, controller of the Northeast Public Power Association; and the numerous Massachusetts municipal light plant managers—including at the Hingham Municipal Light Department, Concord Municipal Light Department and Taunton Municipal Light Department—who provided time, data and perspective to the Berkman Center’s research team in recent months. Alyssa H. Smith, an MIT undergraduate and intern at the Berkman Center, assisted in fact-checking this report.

Funding

The authors gratefully acknowledge the support of the Open Society Foundations, which provided a grant to the Berkman Center to further research aimed at helping communities explore options for providing high-speed Internet access.



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